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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/079,775	02/19/2002	Marina V. Plat	D900D/1368D	9123

7590 11/20/2002

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EXAMINER

LEE, HSIEN MING

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 11/20/2002

3

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

10/079,775

Applicant(s)

PLAT ET AL.

Examiner

Hsien-Ming Lee

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

On page 1, at the section of "CORSS-REFERENCE TO RELATED APPLICATIONS", the serial number should be -- 09/433,591 -- instead of "09/433,541." Appropriate correction is required.
2. The title of the invention is not descriptive with respect to elected claims 1-6. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2 are rejected under 35 U.S.C. 102(e) as being anticipated by Kennedy et al. (US 6,268,457).

Kennedy et al., in Figs. 2a-2h and related text, explicitly and inherently teach the claimed method providing a semiconductor device, the semiconductor including a first layer 22 desired to be etched, the method comprising the steps of:

- (a) providing, by depositing, an antireflective coating (ARC) layer 24 having antireflective properties (Fig.2b);

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- (b) patterning a resist layer 26, the resist layer 26 including a pattern as shown in Fig.2e having an apertures therein for etching the first layer 22, a first portion of the first layer 22 and a second portion of the ARC layer 24 being exposed by the pattern (Fig.2f);
- (c) etching the first portion of the first layer 22 and the second portion of the ARC layer 24 (Fig. 2g); and
- (d) removing the resist layer 26 utilizing a plasma etch having hydrogen reducing chemistry (col. 5, lines 60-61), the ARC layer 24 being resistant to the plasma etch because the ARC layer 24, being a dyed SOG, is resistant to reducing chemistry, gas-based, photoresist stripping process (col.5, lines 32-35).

5. Claims 1-3 are rejected under 35 U.S.C. 102(e) as being anticipated by Chung et al. (US 6,184,142).

Chung et al., in Figs. 3C-3F and related text, explicitly and inherently teach the claimed method providing a semiconductor device, the semiconductor including a first layer 13/15 desired to be etched, the method comprising the steps of:

- (a) providing, by depositing, an antireflective coating (ARC) layer 14, which is a SiON, having antireflective properties (Fig.3C);
- (b) patterning a resist layer 31, the resist layer 31 including a pattern having a plurality of apertures therein for etching the first layer 13/15, a first portion of the first layer 13/15 and a second portion of the ARC layer 14 being exposed by the pattern (Fig.3D);
- (c) etching the first portion of the first layer 13/15 and the second portion of the ARC layer 14 (Figs. 3D-3F); and

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(d) removing the resist layer 31 utilizing a plasma etch with O₂ plasma, the ARC layer 14, which is SiON, being resistant to the plasma etch (O₂ plasma).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al. (US '142) in view of Li et al. (US 6,423,628)

Chung et al. substantially teach the claimed method as stated above, including the ARC layer being the SiON ARC layer, but do not expressly teach that a thickness of the SiON ARC layer is three hundred Angstroms plus or minus no more than approximately ten percent.

However, Li et al., in an analogous art of providing a semiconductor device, teach providing an antireflective coating (ARC) layer 20, which is a SiON (col. 5, lines 3-4) and has a thickness of at a range from about two hundred Angstroms (20 nm) to about four hundreds Angstroms (40 nm), which is within the claimed range of three hundred Angstroms plus or minus no more than approximately ten percent. (col. 5, lines 10-15. Li et al.)

Therefore, it would have been obvious to one of the ordinary skill in the art at the time of the invention was made to deposit the SiON ARC layer of Chung et al. within the thickness range as taught by Li et al. as a desired thickness because by selecting these thickness ranges it would optimize the optical properties of the SiON ARC layer and provide an adequate thickness for the CMP stop layer (col. 5, lines 10-15, Li et al.)

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8. Claims 4 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Chung et al. (US '142) in view of applicants' admitted prior art (hereinafter referred as "AAPA").

With respect to claim 5, Chung et al. substantially teach the claimed method, including removing the resist layer utilizing a plasma etch but do not expressly teach providing a wet preclean after the plasma etching step (d).

However, AAPA in an analogous art teaches providing the ARC layer 52; patterning a resist layer 53; etching a first layer 51 and the ARC layer 53; and removing the resist layer 53 followed by a wet etch (page 2, lines 9-11).

Therefore, it would have been obvious to one of the ordinary skill in the art at the time of the invention was made to perform the wet preclean (i.e. wet etch) as taught by AAPA after removing the resist layer in Chung's method since by doing so it would clean the residues from the plasma etching (page 2, lines 10-11, AAPA), which, in turn, would benefit the critical dimension of the device.

With respect to claim 4, Chung et al. teach removing the resist layer 31 utilizing a plasma etch with a plasma including a forming gas (i.e. O₂) but do not expressly teach that the plasma includes four percent of the forming gas.

However, the selection of the percentage of the forming gas is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). In such a situation, applicants must show that the particular range is critical, generally by showing

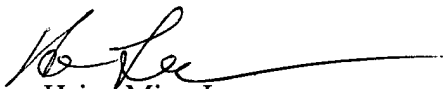
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that that claimed range achieves unexpected results. See M.P.E.P. 2144.05 III. In fact, the originally filed specification does not demonstrate any criticality and/or novelty as to why the forming gas has to be four percent.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-0142 for regular communications and 703-305-0142 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Hsien Ming Lee
November 15, 2002